

Algebra 2 · Quadratic Equations with Complex Solutions · Quiz

Common Core N-CN.C.7, A-REI.B.4b · mathovore.fr

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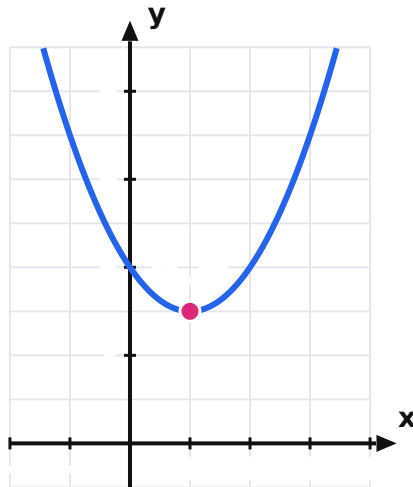
Ten multiple-choice questions on quadratic equations with complex solutions: the discriminant, graphs that miss the x-axis, the quadratic formula with i and conjugate pairs. Choose one answer for each, then read the explanation to find the typical mistake.

Algebra 2 Common Core: **N-CN.C.7 · A-REI.B.4b**

Questions

Question 1

The graph of $y = x^2 - 2x + 4$ is shown. How many real solutions does $x^2 - 2x + 4 = 0$ have?



A parabola.

- A. One real solution
- B. No real solutions
- C. Two real solutions
- D. Infinitely many

Question 2

What is the discriminant of $x^2 + 3x + 5 = 0$?

- A. -11
- B. 29
- C. 11
- D. 1

Question 3

What are the solutions of $x^2+9=0$?

- A. $x=\pm 3$
- B. $x=3i$
- C. $x=\pm 3i$
- D. No solutions at all

Question 4

The equation $x^2-10x+25=0$ has which kind of solutions?

- A. Two different real solutions
- B. One repeated real solution
- C. Two complex solutions
- D. No solutions

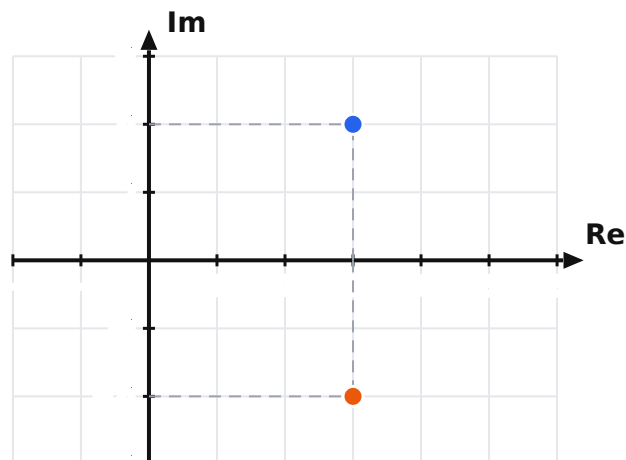
Question 5

What are the solutions of $x^2-2x+5=0$?

- A. $x=1\pm 4i$
- B. $x=2\pm 2i$
- C. $x=-1\pm 2i$
- D. $x=1\pm 2i$

Question 6

The two solutions of a quadratic equation with real coefficients are plotted. Which equation has them as solutions?



Two points in the complex plane.

- A. $x^2 - 6x + 13 = 0$
- B. $x^2 + 6x + 13 = 0$
- C. $x^2 - 6x + 5 = 0$
- D. $x^2 - 6x - 13 = 0$

Question 7

What is the sum of the solutions of $x^2 - 4x + 20 = 0$?

- A. 4
- B. -4
- C. 20
- D. 2

Question 8

One solution of a quadratic with real coefficients is $5 + 2i$. What is the other solution?

- A. $-5 - 2i$
- B. $-5 + 2i$
- C. $2 + 5i$
- D. $5 - 2i$

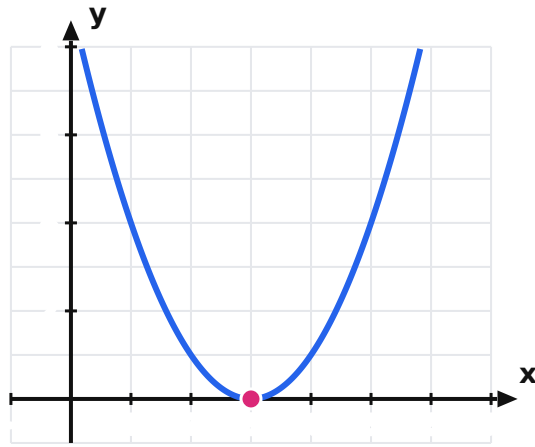
Question 9

For which value of k does $x^2 + 4x + k = 0$ have two complex solutions?

- A. $k = 4$
- B. $k = 3$
- C. $k = 7$
- D. $k = 0$

Question 10

The graph of $y = ax^2 + bx + c$ touches the x-axis at exactly one point. What is true?



A parabola touching the x-axis.

- A. $b^2 - 4ac > 0$
- B. $b^2 - 4ac < 0$
- C. $b^2 - 4ac = 1$
- D. $b^2 - 4ac = 0$

Answer key

1. **B** - The lowest point is $(1,3)$, above the x-axis, so the graph never crosses it. The equation has two complex solutions.
2. **A** - $D = 3^2 - 4(1)(5) = 9 - 20 = -11$. Adding 9 and 20 gives 29 by mistake.
3. **C** - $x^2 = -9$, so $x = \pm\sqrt{-9} = \pm 3i$. There are always two solutions over the complex numbers.
4. **B** - $D = 100 - 100 = 0$, so the only solution is $x = 5$, repeated.
5. **D** - $D = 4 - 20 = -16$, so $x = \frac{2 \pm 4i}{2} = 1 \pm 2i$. Forgetting to divide the imaginary part by 2 gives $1 \pm 4i$.
6. **A** - The solutions are $3 \pm 2i$, with sum 6 and product $9 + 4 = 13$. So $x^2 - 6x + 13 = 0$.
7. **A** - The solutions are $2 \pm 4i$ and their sum is $4 = -\frac{b}{a}$. The number 20 is their product.
8. **D** - Complex solutions of a real quadratic are conjugates, so the other is $5 - 2i$.
9. **C** - $D = 16 - 4k < 0$ needs $k > 4$. Only $k = 7$ works; $k = 4$ gives $D = 0$.
10. **D** - One repeated real solution means the discriminant is 0. A positive discriminant gives two x-intercepts.

Remember:

- The discriminant is $D = b^2 - 4ac$.
- $D > 0$: two real solutions; $D = 0$: one repeated real solution; $D < 0$: two complex solutions.
- For $D < 0$, $\sqrt{D} = i\sqrt{-D}$, so the solutions have the form $p \pm qi$.
- Complex solutions of a real quadratic always come as a conjugate pair.
- Square roots, completing the square, and the formula all reach the same solutions.